

THE TEXAS SPECIES OF *CENTAURIUM* (GENTIANACEAE)

Billie L. Turner

Department of Botany, University of Texas, Austin, Texas 78713 U.S.A.

ABSTRACT

A taxonomic treatment of the Texas species of *Centaurium* is rendered. Ten species are recognized as occurring within the state: *C. arizonicum*; *C. beyrichii*; *C. breviflorum* (Shinners) B.L. Turner; *C. calycosum*; *C. glanduliferum* (Correll) B.L. Turner; *C. maryannum* B.L. Turner; *C. multicaule*; *C. nudicaule*, *C. pulchellum*, and *C. texense*. Complete synonymy, a key to species, and maps showing the geographical distribution of each in Texas and closely adjacent regions are provided, along with an illustration of the holotype of *C. maryannum*.

KEY WORDS: Gentianaceae, *Centaurium*, Texas, México

Centaurium is a taxonomically difficult genus of mostly annual and perennial herbs containing about 60 species. It occurs on nearly all continents and the species are about equally distributed among the Old and New World. Broome (1973, 1975, 1977) has rendered an excellent account of the New World species native to México and Central America, while Dunn (1967) has provided an unpublished revisionary study of the genus for the continental United States.

In Texas, the very attractive commonly encountered roadside species, *Centaurium beyrichii* and *C. calycosum*, are referred to as "pinks", although Correll & Johnston (1970) and yet others use "Centaury" as the common name for the genus as a whole. *Centaurium texense* was the first species to be described from Texas; it was collected by Thomas Drummond in 1834 somewhere between San Felipe (Austin County), Texas and Gonzales (Gonzales County), Texas, only shortly before his untimely death in Cuba in 1835 (Geiser 1957). Subsequent workers added additional taxa to the state's inventory, but no one familiar with the state's bountiful flora has attempted to treat them in detail. Correll & Johnston (1970), without recourse to the study of Broome (1970),

or apparently that of Dunn (1967) recognized only five taxa as native to the state: *C. beyrichii* var. *beyrichii*, *C. beyrichii* var. *glanduliferum*, *C. calycosum* var. *calycosum*, *C. calycosum* var. *breviflorum*, and *C. texense*. In the present treatment I recognize all of these taxa, but elevate the varieties *glanduliferum* and *breviflorum* to specific rank, and have added to the state's inventory five additional species: *C. arizonicum* (subsumed under *C. calycosum* by Correll & Johnston); *C. maryannum* (newly described); *C. multicaule* and *C. nudicaule*, both from trans-Pecos, Texas and more western regions; and *C. pulchellum*, a widespread weedy species believed to be a recent introductant into eastern Texas.

I have attempted to treat the Texas taxa as biological units having populational integrity, this based upon morphogeographical considerations. This is largely the result of many field sorties over various parts of Texas over many years, but mostly as a result of intensive field work in the spring and summer of 1993 during which the roadsides of Central Texas were adorned with billions of pinks, as noted under *Centaureum calycosum* in the treatment that follows.

I realize that the taxa which I have recognized as species might also be treated as but subspecifically or varietally distinct. As noted by Broome (1973, p. 4) "Species boundaries in *Centaureum* frequently are not marked by clear morphological discontinuities ... The more widespread species tend to form several localized morphological races and intergrading forms, and so many of the published binomials surely represent local races which were studied and named out of the context of the total variation pattern of a region ...". In Texas this appears to be the case for *Centaureum calycosum* var. *nanum* (A. Gray) B.L. Rob., which I have subsumed under *C. calycosum*, but the remaining taxa appear to be well-marked populational units worthy of specific recognition. Thus, I treat *C. arizonicum* as a species, while Broome treats it as a variety of *C. calycosum*. Field work clearly shows that the former, in Texas and elsewhere, is largely confined to semiaquatic habitats, while the latter is largely confined to dry uplands. To my knowledge they do not coexist, and they are readily distinguished. Occasional small plants of *C. arizonicum* will superficially resemble *C. calycosum*, and vice versa, this being the cause of confusing distributional maps based only upon herbarium specimens.

Much additional field and experimental work will be needed to confirm the treatment proposed here. To judge from published accounts, chromosome numbers should be helpful in resolving some of the problems, thus Broome (1973) reports $2n = 84$ for *Centaureum calycosum* from Nuevo León, México (which I take to be *C. arizonicum*), $2n = 40$ for *C. calycosum* var. *nanum* (= *C. calycosum*), and $2n = 42$ for *C. texense*, while Holt (by annotation Holt 29, SRSC) reported a count of $2n = 24$ for *C. arizonicum* from Brewster County, Texas.

In the final analysis, however, taxonomic boundaries at the specific level are best judged by experienced field workers who take the time to observe

populations in their natural settings. That is what I have tried to do in rendering the present contribution, although some of my conclusions based solely upon herbarium material are clearly inferential in nature, but even these reflect my knowledge of populational variation of characters in the field.

KEY TO TEXAS SPECIES OF *CENTAURIUM*

1. Lobes of corolla mostly 2-6(-7) mm long; anther sacs (at maturity, when coiled) 0.6-1.5 mm long.
 2. Flower pedicels mostly 3-7 cm long; plants of trans-Pecos Texas.
 3. Cauline leaves subulate to narrowly linear; capsule ovoid, 2.5-3.0 times as long as wide. *C. nudicaule*
 3. Cauline leaves variously ovate to obovate; capsule broadly fusiform in outline, 3-5 times as long as wide. . *C. multicaule*
 2. Flower pedicels mostly 1-3 cm long; plants not in trans-Pecos Texas.
 4. Corolla lobes mostly 2-4 mm long; eastern Texas. *C. pulchellum*
 4. Corolla lobes mostly 4-7 mm long; central and southern Texas.
 5. Corolla lobes mostly 4-5 mm long; anther sacs mostly 0.9-1.1 mm long; mid-stem leaves mostly linear-oblongate, 1-3 mm wide; mostly eastern Edwards Plateau and northwards. *C. texense*
 5. Corolla lobes mostly 5-6(-7) mm long; anther sacs mostly 1.4-1.6 mm long; mid-stem leaves mostly ovate, 3-8 mm wide; southern Texas. *C. breviflorum*
1. Lobes of corolla mostly (5-)6-15 mm long; anther sacs (when coiled) 1.5-2.5 mm long.
 6. Stems, leaves, and calyces invested with minute gland-like papillae, readily observable at magnifications of $\times 20-40$; trans-Pecos Texas. *C. glanduliferum*
 6. Stems, leaves, and calyces glabrous.
 7. Leaves linear-oblongate throughout, mostly 1-3 mm wide; plants robust, mostly 20-40 cm high, much-branched from the very base, and the flowers numerous and densely packed in a divaricately branched, interlocking inflorescence, the flowers confined to the upper 1/5 of the plant; central Texas to Oklahoma. *C. beyrichii*
 7. Leaves, at least those at the base, oblongate, ovate to broadly obovate, 3-12 mm wide; plants not branched as described in the above; south-central Texas westwards to Arizona.

8. Plants mostly 20-40 cm high, the stems weakly spreading, not much-branched, the flowers relatively few and borne mostly erect; plants of subaquatic habitats occurring in silty alluvial soils along streams and about ponds; trans-Pecos Texas. *C. arizonicum*
8. Plants mostly 5-20 cm high, the stems usually divaricately branched, the flowers numerous and variously spreading; plants of xeric habitats occurring in shallow calcareous soils or bare gypseous outcrops, usually along road shoulders.
 9. Plants usually with (3-)4 or more equally developed stems arising from the very base of the plant; apices of style (stigmatic area) ovoid to orbicular in outline, scarcely bifid, if at all; seeds black; gypseous soils of northern Culberson Co. and adjacent New Mexico.
..... *C. maryannum*
 9. Plants usually with 1 stem, this much-branching well above the base (rarely 2 or more through mainstem-injury, or sometimes occasional multi-stemmed plants in an otherwise largely one-stemmed population); apices of style (stigmatic area) fan-shaped in outline and up to 1.2 mm broad, or else markedly bifid; seeds brown; eastern trans-Pecos and central Texas. *C. calycosum*

Centaurium arizonicum (A. Gray) Heller, *Muhlenbergia* 4:86. 1908.

Erythraea calycosa Buckl. var. *arizonica* A. Gray, *Syn. Fl. N. Amer.* 2(1):113. 1878. *Erythraea arizonica* (A. Gray) Rydb., *Bull. Torrey Bot. Club* 33:148. 1906. *Centaurium calycosum* (Buckl.) Fernald var. *arizonicum* (A. Gray) Tidestrom, *Proc. Biol. Soc. Wash.* 48:42. 1935. TYPE: UNITED STATES. Utah: Washington Co.: St. George, 1875, *E. Palmer s.n.* (LECTOTYPE: GH!, designated here, also designated by Broome through annotation, 1979).

Dunn (1967) recognized this taxon as a species, although Broome (1973) treated it as a variety of *Centaurium calycosum*. It (*C. arizonicum*) superficially resembles *C. calycosum* but is readily distinguished by its proclivity for moist alluvial soils of stream banks, pond margins or very wet seeps. The populations are mostly quite small and localized (i.e., patchy), and readily distinguished from *C. calycosum* by habit and branching patterns. As noted by Broome (1973, p. 158), the stems of *C. arizonicum* are only sparingly branched while those of *C. calycosum* form a tight numerous-flowered inflorescence; the

stems of *C. arizonicum* are only sparingly branched. Depauperate forms of *C. arizonicum* may superficially resemble sparsely branched forms of *C. calycosum*, but for the most part the two taxa are readily distinguished, especially in the field.

Centaurium beyrichii (Torrey & Gray) B.L. Rob., Proc. Amer. Acad. Arts 65:396. 1910. BASIONYM: *Erythraea beyrichii* Torrey & Gray ex Torrey in Marcy, *Expl. Red River* 291. 1853. TYPE: UNITED STATES. Arkansas Territory: w/o date or locality, *Beyrich s.n.* (HOLOTYPE: GH; Photoholotype: DUKE!). *Erythraea trichantha* Willd. var. *angustifolia* Griseb. in DC., *Prodr.* 9:60. 1845.

This species is relatively common in the Edwards Plateau region of Central Texas, often forming spectacular populations of massively flowering intricately branched individuals 20-40 cm high. It sometimes occurs near or with *Centaurium calycosum* and the occasional hybrid between these probably occurs. It is possible that what has been called *C. calycosum* var. *nanum* is a series of variable populations derived from ancestral hybridization or perhaps recent gene flow of *C. beyrichii* into the somewhat more western *C. calycosum*. Indeed, Dunn (by annotation, TEX) took some of the individuals of *C. calycosum* var. *nanum* to be hybrids of *C. arizonicum* \times *C. texense*, which is unlikely since these two taxa are not known to occur together. In any case, plants referred to var. *nanum* are essentially rather dwarfish copies of *C. beyrichii*, but the basal leaves are broader, the corollas are smaller, and the lobes mostly possess broadly acute or obtuse apices.

Centaurium breviflorum (Shinners) B.L. Turner, *stat. et comb. nov.* BASIONYM: *Centaurium calycosum* (Buckl.) Fernald var. *breviflorum* Shinners, *Field & Lab.* 18:130. 1950. TYPE: UNITED STATES. Texas: Cameron Co.: NW of Brownsville, 6 Apr 1941, *C.L. Lundell 10022* (HOLOTYPE: SMU).

Centaurium breviflorum is closely related to *C. calycosum* and *C. texense* and most workers have annotated the sheets concerned as one or the other, although Broome, by annotation, recognized four taxa from among what I recognize as *C. breviflorum* (*C. calycosum* var. *arizonicum*, *C. calycosum* var. *calycosum*, *C. calycosum* var. *nanum*, and *C. texense*). However, the several taxa are readily distinguished by the characters given in the Key to Species and each occurs in a distinctive ecogeographic setting: *C. breviflorum* in sandy or alluvial soils of southern Texas; *C. calycosum* in shallow rocky soils of the more western portions of the Edwards Plateau; and *C. texense* in rocky or calcareous seeps along the more eastern portions of the Edwards Plateau, as

discussed under the latter. Further, *C. calycosum* nearly always occurs in very large nearly continuous populations, among which small-flowered individuals may or may not occur (cf. discussion under that species), whereas *C. texense* is a relatively uncommon, but widespread taxon, usually occurring as isolated individuals, or as small patchy populations. Indeed, I have not found *C. calycosum* and *C. texense* occurring together, these being for the most part allopatric.

Centaurium calycosum (Buckl.) Fernald, *Rhodora* 10:54. 1908. BASIONYM: *Erythraea calycosa* Buckl., *Proc. Acad. Nat. Sci. Phila.* 2:7. 1862. TYPE: UNITED STATES. Texas: Mason Co.: N of Ft. Mason, *S.B. Buckley s.n.* (HOLOTYPE: PH; Photoholotype: DUKE!).

Erythraea calycosa Buckl. var. *nana* A. Gray, *Syn. Fl. N. Amer.* 2:113. 1878. *Centaurium calycosum* (Buckl.) Fernald var. *nanum* (A. Gray) B.L. Rob., *Proc. Amer. Acad. Arts* 45:395. 1910. TYPE: UNITED STATES. Texas: "Stoney hills, W. Texas", 1852, *C. Wright 1662* (LECTOTYPE: GH!, designated here; Isolectotypes: GH!, 2 sheets).

Broome (1974) recognized three varieties within this taxon: var. *arizonicum*, var. *nanum*, and var. *calycosum*. I recognize the former as a good species, but have been unable to adequately differentiate between the latter two taxa. Broome noted that the "The status of *nanum* as a variety of *C. calycosum* is greatly suspect." My own belief is that var. *nanum* has been applied to populational forms and/or individuals with generally smaller, simple-stemmed plants of var. *calycosum* having mostly narrowly oblanceolate mid-stem leaves and mostly smaller corollas with paler colors. Field observations of individuals and/or populations referable to these two names during the late spring of 1993 (during which time populations were abundant almost everywhere across the range of *Centaurium calycosum*) has led me to believe that *C. calycosum* is a heterogeneous assemblage of variable populations and is best treated as such. I have observed populations in which the majority of individuals might be referable to var. *calycosum*, and yet others in which most individuals might be referable to var. *nanum*; among both such populations, individuals occur which are variously intermediate between these two taxa, as recognized by Broome (1974). Documentation of this assessment is on file at TEX in the form of numerous vouchers with accompanying colored photographs. It is remotely possible that these two varietal names apply to two closely related sympatric species which are hybridizing, but this is not clearly discernible in the field. Alternatively, the names might apply to two intergrading, varietal taxa, but if so, their distributions are not suggestive of intergrading allopatric taxa of the usual sort.

I have discussed the possibility that the variation discussed in the above might be due to occasional or long-time hybridization between *Centaurium calycosum* and *C. beyrichii* (discussed under the latter), but this is largely speculative.

Nevertheless, as noted by Broome (1974), Dunn (1967) treated forms referable to var. *nanum* as part of "a vast polymorphic hybrid swarm between *C. calycosum* (sensu stricto) and *C. texense*." As indicated in the above, my own view is that var. *nanum* is a name applied to small-flowered forms of *Centaurium calycosum* var. *calycosum*, such flowers occurring on either robust individuals or, more frequently, on depauperate individuals, the latter usually with linear-lanceolate mid-stem leaves.

Correll & Johnston (1970) did not recognize var. *nanum* (perhaps ignorant of its existence) but they did recognize var. *breviflorum*, a seemingly distinct taxon of mostly alluvial soils in southern Texas which I have elevated to specific status. Broome (1974) treated var. *breviflorum* as a synonym of *Centaurium calycosum* var. *calycosum*, while retaining *C. texense*.

Figures 1 and 2 show the distribution of *Centaurium calycosum* as determined from specimens on deposit at LL, NMC, SRSC, and TEX. As noted in the above it is an abundant roadside weed in the more western portions of the Edwards Plateau, barely extending into adjacent México. It is replaced in the more eastern portions of the Edwards Plateau by *C. texense*, the latter having a smaller more strict habit with fewer flowers and smaller corollas. Small-flowered forms of var. *calycosum* are often confused with *C. texense*, but the latter taxon is readily distinguished by its smaller anthers and shorter corolla lobes; additionally it does not form the massive populational display shown in *C. calycosum*, rather the plants of *C. texense* are relatively uncommon along the base of limestone bluffs in seeps, especially along the eastern part of the Edwards Plateau. *Centaurium texense* also occurs sporadically in granitic or sandy soils of the Central Mineral Region of Texas.

***Centaurium glanduliferum* (Correll) B.L. Turner, *comb. et stat. nov.* BAsIONYM: *Centaurium beyrichii* (Torrey & Gray) B.L. Rob. var. *glanduliferum* Correll, *Wrightia* 4:76. 1968. TYPE: UNITED STATES. Texas: Terrell Co.: 8 mi W of Sanderson, 13 Sep 1961, *Correll & Johnston* 24580 (HOLOTYPE: LL!).**

This is a very distinctive taxon, having the basal foliage of *Centaurium beyrichii*, the branching habit and seeds of *C. maryannum*, and the corollas of *C. calycosum*. It differs from all of these in having a minute vestiture of papillose "glands" or gland-like enations on its leaves, stems, and calyces, readily observable at magnifications of $\times 20-40$. Initially known only by the holotype, a number of locality records have recently come to the fore, as follows: Texas:

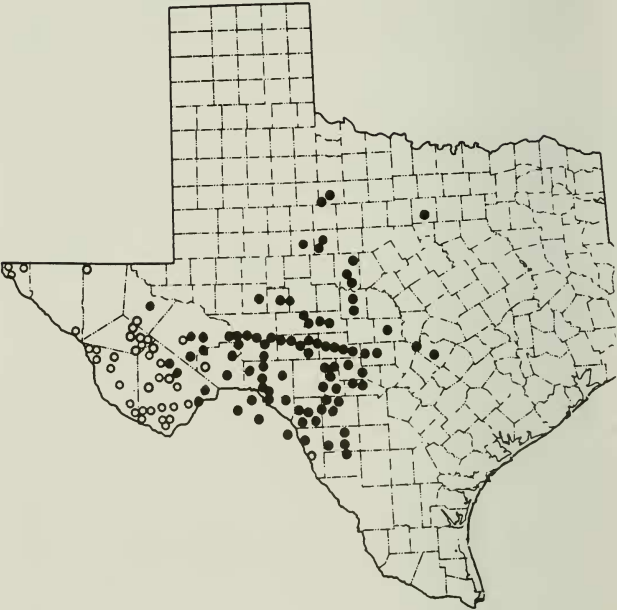


Figure 1. Distribution of *Centaurium arizonicum* (open circles) and *C. calycosum* (closed circles) in Texas.

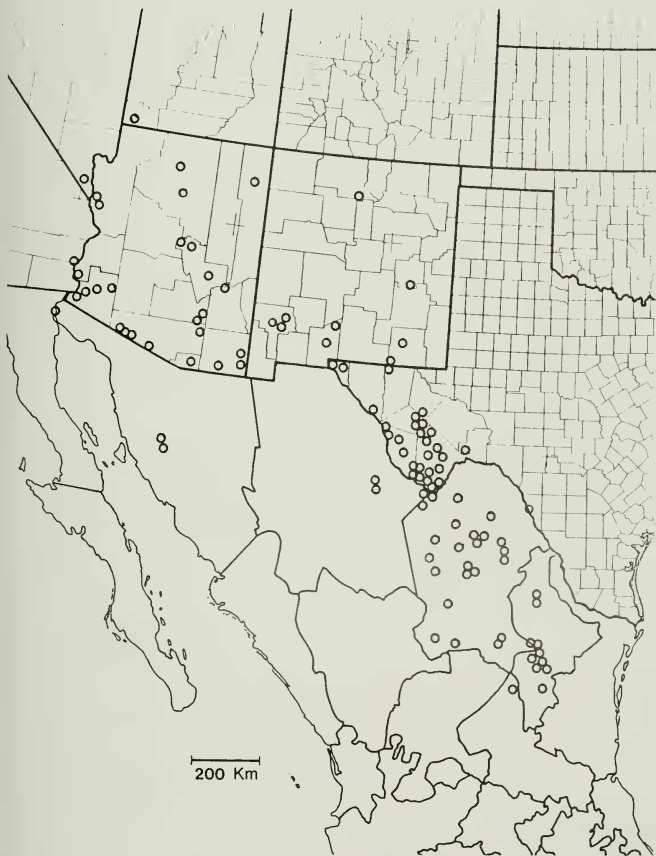


Figure 2. Distribution of *Centaurium arizonicum* in Texas and surrounding areas.

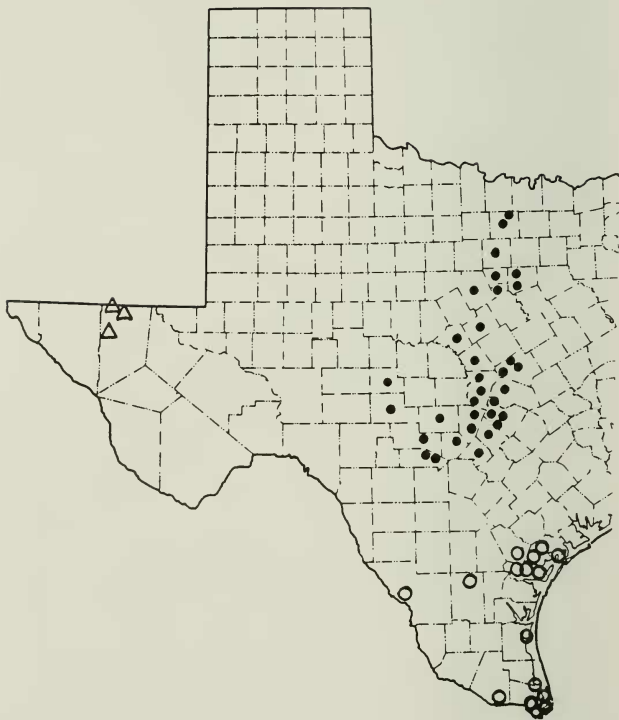


Figure 3. Distribution of *Centaureum beyrichii* (closed circles), *C. parviflorum* (open circles), and *C. maryannum* (open triangles) in Texas.

Brewster Co., Roadside hwy 285, 27.7 mi N of Sanderson, 17 Jul 1993, A.M. & S.A. Powell 5947 (SRSC,TEX); Roadside hwy 90, 22 mi E of Marathon, 17 Jul 1993, A.M. & S.A. Powell 5948 (SRSC,TEX). Pecos Co.: 40 to 45 mi SE of Ft. Stockton, 1 Jul 1955, B.H. Warnock 13427 (LL,SRSC,TEX).

Centaureum maryannum B.L. Turner, *sp. nov.* Figure 4. TYPE: UNITED STATES. Texas: Culberson Co.: ca. 2 mi E of intersection of state highways 1108 and 652, ca. 15 airline mi S of White City, New Mexico, 22 May 1967, B.L. Turner 5660 (HOLOTYPE: TEX).

Centaureo arizonico A. Gray similis sed differt habitatione solis aridis gypseis sterilibusque (vs. solis alluvialibus subaquaticis), habitu minore (plerumque 5-20 cm altis vs. 20-50 cm altis) caulibus numerosioribus coarctatis ad basim exorientibus, et partis stigmaticae angustissimae ca. 0.25 mm latae (vs. 0.5-1.0 mm latae) vulgo subcapitatae (vs. flabelliformis).

Annual glabrous herbs mostly 5-20 cm high. Stems (3-)5-30 arising from slender or thickened tap roots, rarely, if ever, with a single stem arising from the crown of the root. Midstem leaves mostly oblanceolate to linear-oblanceolate, less often narrowly elliptic, 15-25 mm long, 1.5-4.0 mm wide; basal leaves forming a persistent rosette, similar to the cauline leaves but larger (up to 5 cm long and 0.8 cm wide). Flowers numerous, arranged in rather congested cymes, the pedicels mostly 0.5-2.0 cm long. Sepals linear-lanceolate, mostly 7-10 mm long, free to the base or nearly so. Corollas pink, the tubes mostly 10-12 mm long, the slightly enlarged throat 1-2 mm long (yellowish within), the lobes mostly 6-8 mm long, 1-4 mm wide, the apices acute to broadly obtuse. Anthers yellow, 2.0-2.2 mm long after dehiscence. Styles extending somewhat beyond the exerted anthers, the swollen apex or stigmatic region weakly bilobed, if at all, essentially oval or rounded in outline, ca. 0.5 mm across. Capsules about as long as the tube, the seed numerous, subrhomboid, markedly alveolate, at maturity black, ca. 0.3-0.4 mm long. Chromosome number, $2n = 42$ (Soreng & Spellenberg 2107, NMC!).

ADDITIONAL SPECIMENS EXAMINED: New Mexico: Chaves Co.: 10 mi E of Roswell along hwy 70, gypsum soils, 13 Jun 1974, Higgins 8689 (NMC); ca. 7 mi E of Roswell along hwy 390, gypsum hills, 30 Jun 1973, Powell 2533 (LL); 19 mi S of Mesa, in "pure" gypsum, 9 Jun 1973, Turner 8023 (LL). De Baca Co.: 10-2/3 mi NE of Dunlap, 23 Jun 1942, Cory 37568 (GH); 25 mi E of junction 285-20 along hwy 20, gypsum soil, 26 Jun 1973, Higgins 7468 (NMC). Eddy Co.: S of Carlsbad near White City, 18 May 1940, Hershey 2529 (NMC); S of Carlsbad, 28 May 1942, Hershey 2687 (GH, NMC); gypsum flats ca. 30 mi NE of Carlsbad, 30 Jun 1973, Powell 2535 (LL); 10 mi SW

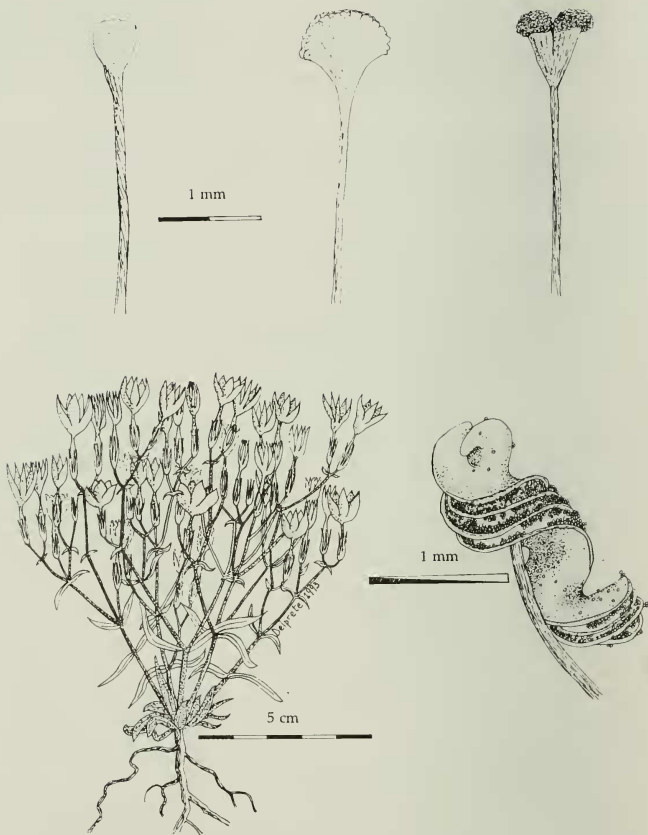


Figure 4. *Centaurium maryannum*, "Lady Langford's Centaury", from holotype. Habit, lower left; anther lower right; style branches, left to right: *C. maryannum*; *C. arizonicum*; *C. calycosum*.

of Whites City, gyp soil, 22 May 1967, Turner 5656; just N of Texas-N. Mex. border along hwy 180, bare gypsum ridges, 29 May 1993, B.L. & Gayle Turner 93-8 (TEX); 7 mi S of Whites City, 10 Aug 1946, Waterfall 6546 (GH). Otero Co.: White Sands, 25 Oct 1935, Hershey s.n. (NMC); White Sands, 13 mi SW of Alamogordo, interdunal flats, 1 May 1983, Soreng & Spellenberg 2107 (NMC); gypsum sand hills at White Sands Natl. Monument, 27 Aug 1951, Warnock 10055 (SRSC). Texas: Culberson Co.: 40 mi NE of Van Horn, gyp hills, 10 Jul 1943, Waterfall 5000 (GH).

As noted earlier, this taxon superficially resembles *Centaurium calycosum*, an abundant highly variable species of central Texas where it occurs on predominantly shallow calcareous soils. *Centaurium maryannum* is readily distinguished from the latter by its proclivity for gypseous soils, numerous stems arising from the crown of the root, persistent basal leaves, and small, scarcely bifid, ovoid to globose styler region (ca. 0.4 mm wide, vs. flabellate and 0.8-1.5 mm wide and/or markedly cleft at the apex).

The type of *Centaurium maryannum* was annotated by D.S. Correll (who treated *Centaurium* for the *Manual of the Vascular Plants of Texas*; Correll & Johnston 1970) as *C. beyrichii*, while Broome (in connection with her study of the Mexican and Central American species) annotated it as *C. calycosum* var. *nanum*, although she annotated three of the above cited paratypes as *C. calycosum* var. *arizonicum*.

It is a pleasure to name this relatively rare species for the exceptional mother of my wife Gayle, "Lady" Mary Ann Langford-Taylor, nee Glass, who has cheerfully tolerated our many overnight visits to her home in San Angelo, Texas as we passed westward doing fieldwork. The state of Texas now has two native Centaury plants, or "pinks", with common names coined after exceptional ladies: Lady Bird's Centaury [or Pink] (cf. Correll & Johnston, p. 1207), and the present Lady Langford's Centaury.

Centaurium multicaule B.L. Rob., Proc. Amer. Acad. Arts 45:396. 1940.

TYPE: MEXICO. Chihuahua: Moist meadow, Hacienda St. Diego, 2 Jun 1891, Hartman 717 (HOLOTYPE: GH).

This largely Mexican taxon is superficially similar to *Centaurium nudicaule* and *C. arizonicum*, possessing the general habit of the former but having corollas of the latter. Only a single collection has been seen from Texas, as follows: Presidio Co.: Infrequent on west slope of Elephant Mountain, 26 Apr 1959, T.J. Allen 20 (SRSC). Prof. A.M. Powell of SRSC informed me that Elephant Mt. is located in the northeastern portion of Presidio County and is not to be confused with the better known Elephant Butte in Brewster County.

Broome (1979, by annotation) referred the specimen concerned to *Centaurium calycosum* var. *arizonicum* "approaching *C. multicaule*". I think the plant

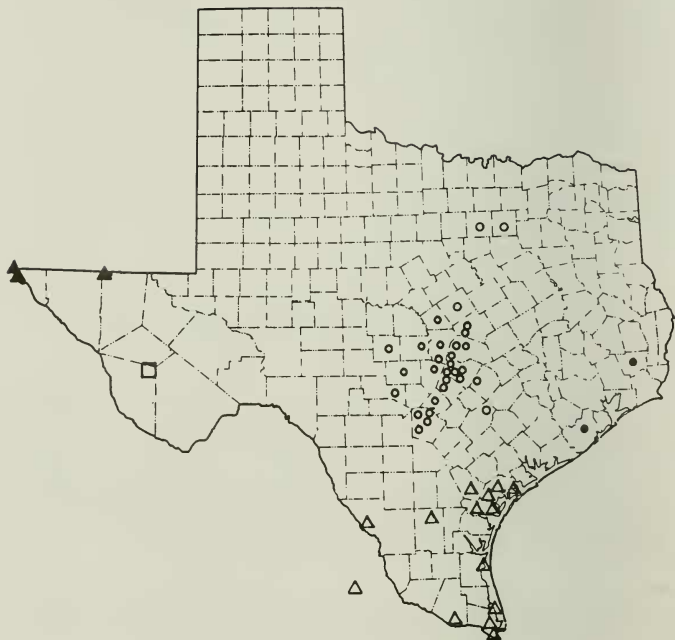


Figure 5. Distribution of *Centaurium* species in Texas: *C. multicaule* (open square); *C. nudicaule* (closed triangles); *C. parviflorum* (open triangles); *C. pulchellum* (closed circles); *C. texense* (open circles).

Table 1. Chromosome numbers of Texas species of *Centaurium*.

SPECIES	REFERENCE OR VOUCHER	NUMBER (2n)
<i>C. arizonicum</i>	TEX. Brewster Co.: Holt 24 (SRSC)	12 prs
<i>C. arizonicum</i>	MEX. Nuevo León: Broome 1978 (reported as <i>C. calycosum</i> var. <i>calycosum</i>)	42 prs
<i>C. beyrichii</i>	TEX. Bandera Co.: Broome 1978	41 prs
<i>C. calycosum</i>	TEX. Kerr Co.: Broome 1978	20 prs
<i>C. calycosum</i>	TEX. Bandera Co.: Broome 1978 (both reported as <i>C. calycosum</i> var. <i>nanum</i>)	20 prs
<i>C. maryannum</i>	N. MEX. Gypsum dunes: Ward 1984 (reported as <i>C. texense</i>)	21 prs
<i>C. multicaule</i>	MEX. Chihuahua: Powell 2487 (LL)	ca. 40 univalents
<i>C. nudicaule</i>	MEX. Nayarit: Broome 1978	21 prs
<i>C. pulchellum</i>	Six or more counts from over a wide region (Index to plant chromosome numbers, 1959-89)	7, 9, 18, 19 27 prs
<i>C. texense</i>	TEX. Bandera Co.: Broome 1978	21 prs

is readily referable to *C. multicaule*, several collections of which are known to occur in closely adjacent Chihuahua, México (e.g., Powell *et al.* 2487, LL).

Centaurium nudicaule (Engelm.) B.L. Rob., Proc. Amer. Acad. Arts 45:397. 1910. BASIONYM: *Erythraea nudicaulis* Engelm., Proc. Amer. Acad. Arts 17:222. 1882. TYPE: UNITED STATES. Arizona: Base of Santa Catalina Mts., Apr 1881, Pringle 154 (HOLOTYPE: GH).

This mostly Mexican species was reported from the U.S.A. by Broome (1974). She cited only three collections, all from southern Arizona. Since her work additional collections from the U.S.A. have been made in New Mexico (Doña Ana Co.: near the TEX-NM state line, E side of Mountains S of O'Hara Rd., 4600 ft, limestone slope, 26 Apr 1981, Worthington 7007 (NMC,TEX), and in Texas (Hudspeth Co.: Guadalupe Mts. Nat'l. Park, base of S. Stagecoach Hill, ca. 3950 ft, coarse alluvial deposits along wash on S side of gypsum outcrop, 17 Apr 1975, Burgess 3146 (LL,SRSC).

Because of the proximity of the Doña Ana County collection to the Texas border, *Centaurium nudicaule* is likely to be found in El Paso County. The species is readily distinguished by its relatively large ovoid capsules borne upon elongate pedicels, and by its relatively short styles which are terminated by disproportionately large flabellate stigmatic regions.

Centaurium pulchellum (Sw.) Druce, *Fl. Berks.* 342. 1898. BASIONYM: *Gentiana pulchella* Sw.

This small-flowered, mostly European, weedy taxon is known to Texas by at least two collections (Hardin Co.: *Correll & Correll 38794*, LL; and Brazoria Co., *Fleetwood 9249*, TEX), both perhaps recent introductions into the state.

Centaurium texense (Griseb. ex Hook.) Fern., *Rhodora* 10:54. 1908. BASIONYM: *Erythraea texensis* Griseb. ex Hook, *Gen. & Sp. Gent.* 139. 1839. TYPE: UNITED STATES. Texas: Austin Co., San Felipe, 1834, *Drummond 231* (HOLOTYPE: K; Isotype: GH!). It should be noted here that Fernald, in his transfer of *Erythraea texensis*, apparently erred in citing the original publication of the basionym, giving its source as *E. texensis* Griseb. ex Hook., *Fl. Bor. Amer.* 2:58. 1838. Consultation of the latter will show that the name *E. texensis* is nowhere to be found in the text.

The type of *Centaurium texensis* is said to be from San Felipe, Texas, which is in present day Austin County. As can be seen from Figure 1, *C. texense* is mostly confined to limestone soils of the Edwards Plateau Region of Texas and northwards, thus the type is anomalous in occurring in an isolated region of mostly sandy soils. According to Geiser (1948), Drummond is not known to have traveled as far west as the Edwards Plateau, but he did collect in Gonzales County, ca. 100 miles west of San Felipe, and it is possible that he collected type material in this vicinity. Regardless, the materials which I examined are unmistakably the same as material along the eastern portions of the Edwards Plateau.

Broome (1973, p. 114) notes that *Centaurium calycosum* var. *nanum* "is doubtfully distinct from *C. texense*", although she maintained both taxa, not having had the opportunity "to study first-hand in the field" the Texas taxa (p. 138). Because of its small corollas, *Centaurium breviflorum* might be mistaken for small-flowered forms of *C. calycosum*, which have been referred to as *C. calycosum* var. *nanum*. The latter are readily distinguished from *C. breviflorum* by their larger broader corolla lobes (mostly 6-7 mm long vs. 5-6 mm) and larger anther sacs.

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